	24Gy						18Gy						
	Ring5mm(Gy)			Ring10-5mm(Gy)				Ring5mm(Gy)			Ring10-5mm(Gy)		
Patient	MLCi1	Agility	Diff	MLCi1	Agility	Diff	Patient	MLCi1	Agility	Diff	MLCi1	Agility	Diff
1	12.2	10	2.2	5.6	4.6	1	6	12.4	10.9	1.5	5.5	4.7	0.8
2	12.9	10.9	2	6.3	5.3	1	7	14.6	13.8	0.8	4.5	3.8	0.7
3	11.9	10.4	1.5	5.6	4.8	0.8	8	13.5	12.3	1.2	7.6	6.2	1.4
4	19.9	17.9	2	5.4	4	1.4	9	14.5	13.8	0.7	5.2	4.6	0.6
5	16.5	15.1	1.4	8.4	7.1	1.2	10	13.3	12.9	0.4	7.2	6.7	0.5
mean	14.2	12.9	**1.8**	6.2	5.2	**1.1**	mean	13.7	12.7	**0.9**	6	5.2	**0.8**
SD	3.5	3.5	**0.3**	1.2	1.2	**0.2**	SD	0.9	1.2	**0.4**	1.3	1.2	**0.4**

Tabel 1: Mean dose in the rings around the PTV at 5 mm and 10 mm for small lesions (PTV volume < 4 cm³) and the larger lesion (PTV volume between 4 and 14 cm³)

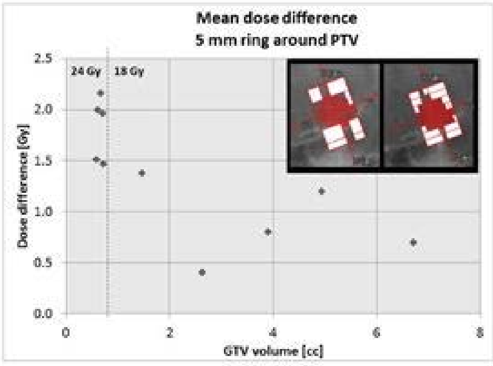

Figure 1: The mean dose difference in the first 5 mm ring around PTV. In the right upper corner the typical leaf setting for the Agility on the right and the MLCi1 on the left.

Conclusion: For the small lesions with a volume smaller than 4 cm³ the Agility shows a steeper gradient in the two surrounding rings than the MLCi1. Therefore we recommend the use of the Agility for treating the smaller lesions.

EP-1681

A treatment planning strategy for SBRT of multiple T1-2 lung tumors

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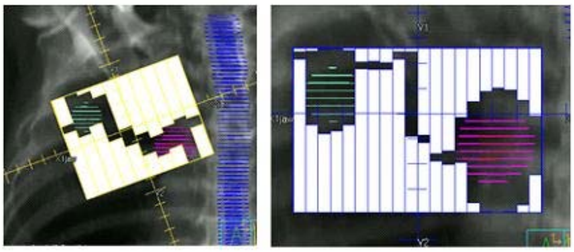
Purpose or Objective: To obtain a planning technique for SBRT treatment of multiple lung tumors, which is suitable for all relative positions of the tumors.

Material and Methods: For 10 patients with two tumors, treated with 3 x 18Gy, VMAT plans were generated in Pinnacle, using various approaches: simultaneous versus sequential optimization, with or without the dose distribution of one tumor as background for optimization of the other tumor. The quality of the treatment plans was judged on coverage (PTV V100% >95%), conformity (V100%/PTV volume), inhomogeneity (PTV D0<165%) and dose constraints on OARs.

Results: Simple addition of beams for two independently planned tumors does not yield optimal results since the mutual low dose contributions cannot be taken into account properly. Simultaneous optimization on both targets results in pairs of open leafs in-between the lesions (Fig 1). We therefore concluded that the strategy that yields the most conformal plans is the subsequent planning of the tumors using a dual-arc for both, where the dose distribution resulting from the planning of the first target is used as a background dose while optimizing the beams for the second target. During optimization of the first tumor, no limit is applied for the dose to the second PTV, since this can be compensated for in the optimization procedure for this PTV. After optimization of the second PTV, the number of monitor units in each beam pair might be adjusted slightly to conform to the required target coverage. This strategy works for two or more isocenters as well as for one mutual isocenter. For three or more tumors, iterating the above method yields good results



Two examples of simultaneous optimizing on both targets (fig1)

Conclusion: We developed a generic planning strategy to obtain high quality lung SBRT-treatment plans for patients with multiple lung tumors. The strategy uses a dual-arc VMAT for each tumor, while taking the dose distribution covering the first target is used as background during dose optimization for the second target. This method is clinically in use since March 2015, since then 15 patients have been treated using this method.

EP-1682

Breast and regional lymph nodes RT: V-MAT/RapidArc and Tomotherapy comparison

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Purpose or Objective: Two centers compared VMAT/RapidArc (RA) and Tomotherapy (TOMO). for the irradiation of breast and regional lymph nodes.

Material and Methods: Five left and five right breasts plus regional nodes have been contoured by two dedicated radiation oncologists. Two senior physicists checked the treatment plans studied by dedicated dosimetrists. The Anatom-e tool was tested for improving definition and avoiding interpersonal variability in the contouring. Prescription, according to ICRU, was 50 Gy in 25 daily fractions. We considered both lungs, the heart, the left anterior descending coronary artery (LAD), the controlateral breast and the thyroid as Organa t Risk (OaR). The dose constraints were: PTV V95=95%, ipsilateral lung V2020%, heart mean dose < 10Gy, heart max dose <35Gy, LAD max dose ≤20Gy, thyroid max dose < 45 Gy and contralateral breast max dose≤5 Gy. We have studied the treatments in free breathing modality, perfectly aware of the higher dose received by heart and LAD in comparison to the respiratory-gated modality, routinely used in the RA center.

Results: We summarized the results of this comparison in Table 1
Table 1. Left and right breast plus lymphnodes.

	TOMO	RA
LEFT BREAST + LN	% (±SD)	% (±SD)
V95% PTV	94.9 (±0.5)	95.1 (±10)
V20Gyipsilateral lung	15.9 (±1.3)	22.2 (±3.2)
	Median dose Gy (±SD)	**Median dose Gy (±SD)**
LAD	4.7 (±0.9)	15.7 (±4.5)
Heart	3.5 (±3.8)	9.0 (±1.7)
Contralateral breast	5.1 (±1.4)	4.2 (±1.1)
	Median min (±SD)	**Median min (±SD)**
Beam-on time	6.91min (±0.21)	1.03min (±0.03)
RIGHT BREAST + LN	% (±SD)	% (±SD)
V95 PTV	95.0 (±0.5)	94.9 (±0.1)
V20 ipsilateral lung	19.4%(±3.1)	21.2%(±1.5)
	Median dose Gy (±SD)	**Median dose Gy (±SD)**
LAD	2.0 Gy (±1.1)	7.7 Gy (±0.9)
Heart	5.9 Gy (±0.8)	6.8 Gy (±1.5)
Contralateral breast	3.6 Gy± (0.5)	4.2 Gy (±0.4)
	Median min (±SD)	**Median min (±SD)**
Beam-on time	5.9min (±0.26)	1.07min (±0.01)

Conclusion: Both techniques allow a good coverage and dose uniformity for the PTV, with proper sparing of the OaR. TOMO